

REMARKS

Applicants note the objection to the drawings lodged in the outstanding Official Action. Applicants have submitted new formal drawings which overcome the illegible nature of the drawings currently of record in the file of the present application. Applicants submit that the enclosed drawings overcome these grounds of objection.

All the claims submitted for examination in this application have been rejected on formal and/or substantive grounds. Applicants have amended their claims and respectfully submit that all the claims currently in this application are patentable over the rejection of record.

Turning first to the formal grounds of rejection, original Claim 11, from which Claims 12 and 13 depend, and Claim 14 recite "said inner screen." However, independent Claims 1 and 10, from which Claims 11 and 14 depend in the alternative, make no mention of an inner screen.

Applicants have amended independent Claims 1 and 10 as new Claims 15 and 17, respectively. These claims further define the first and second coke-burning zones as each including a radial bed, an inner screen and an outer screen. The amendment of original independent Claims 1 and 10, as new Claims 15 and 17, respectively, thus provide antecedent basis for the recitation of "said inner screen" in Claims 11 and 14. Reconsideration and removal of this ground of rejection is therefore deemed appropriate. Such action is respectfully urged.

In addition to the amendment of Claims 1 and 10, as new Claims 15 and 17, respectively, Claim 2 has been amended as new Claim 16. New Claim 16 better describes the limitation of original Claim 2 to more precisely define the drying step.

All the claims not rejected on formal grounds have been rejected on substantive grounds. Specifically, Claims 1-10 stand rejected, under 35 U.S.C. §102(b), as being anticipated by U.S. Patent 5,034,117 to De Bonneville et al.

The Official Action avers that De Bonneville et al. discloses a process for regenerating a reforming catalyst characterized in that the exhausted catalyst successfully is contacted in a first radial moving bed combustion zone, a second radial moving bed combustion zone, an axial oxychlorination bed zone and an axial calcinations moving bed zone.

Of critical importance is the allegation in the outstanding Official Action that the De Bonneville et al. discloses that regeneration gas is recirculated through the first and second combustion zones. Therefore, the first coke-burning zone is contacted with the regeneration gas from the second coke-burning zone. Furthermore, the Official Action argues that the De Bonneville et al. emphasizes that the catalyst circulates under the effect of gravity and that De Bonneville et al. also provides a drying zone.

It is noted that the Official Action submits that the limitations of Claims 3 and 4 are inherently anticipated insofar as the regeneration gas moves in a centrifugal or centripetal manner. This is so because De Bonneville et al. discloses coke-burning combustion zones having radially moving beds. The Official Action further argues that the pressure limitations of Claims 5 and 10-14 are disclosed in De Bonneville et al. The Official Action states that further limitations regarding the temperature of the reactor, as well as water and oxygen concentrations of the regeneration gas, are disclosed by De Bonneville et al.

It is axiomatic that a rejection under 35 U.S.C. §102(b), the grounds imposed in the substantive rejection of record, include each and every limitation of the claimed subject to that rejection. Independent Claims 15 and 17 which, in addition to the added limitations discussed

above, represent original Claims 1 and 10, respectively, redrafted to correct minor grammatical errors, recite that regeneration gas first enters the second coke-burning zone prior to passing into the first coke-burning zone. The process discussed in De Bonneville et al. employs a regeneration gas which first enters the first coke-burning zone and flows downwardly into the second coke-burning zone.

Attention is directed to De Bonneville et al. at Column 5, line 67 to Column 6, line 21. Therein, the regeneration gas flow is described. It is stated that in the first combustion zone "a combustion gas based on an inert gas circulating in co-flow relationship with the catalyst ..." treats the catalyst. It is thereafter mentioned that the catalyst, in the second combustion zone, is treated with "gases from the first combustion zone ...". Finally, the burning gases "are discharged from the second burning zone and passed to a washing loop ...". It is mentioned in passing that the catalyst flow, which, as stated above, is in the same flow direction as the regeneration gas, flows from the first burning zone to the second burning zone (Column 4, lines 5-17).

This point predicates novelty, under 35 U.S.C. §102(b) over De Bonneville et al. This novelty is unobvious insofar as it permits the regeneration gas to enter the second coke-burning zone at a much lower water content. As those skilled in the art are aware, the lower the water content, the longer the service life of the catalyst. Indeed, the purpose of the process invention of the present application is to continuously regenerate catalyst under an environment of lower temperature and lower water content compared to prior art teachings (Specification at Page 6, lines 2 to 8). Indeed, the Bonneville et al. patent is specifically mentioned in the specification, at Page 5, lines 1 to 22, as being illustrative of processes having the deficiencies which are overcome by the invention of the present application.

That the distinguished process, defined by all the amended claims presently in the subject application, produces a second burning zone having a reduced water content compared to that of the prior art exemplified by De Bonneville et al., is established by a stoichiometric analysis of that zone. As indicated in De Bonneville et al., at Column 3, lines 29-35, the cycling rate of the catalyst is 1000 kg/hr. This is so insofar as a rate of 1 ton per hour in metric units, used in that disclosure, is 1000 kg/hr. The coke content of that catalyst is about 5 wt% (Column 3, lines 34-35) and the flow rate of the regeneration gas is 6,000 to 10,000 normal m²/hr (Column 2, lines 51 to 60). This flow rate will be assumed to be 10,000 m²/hr at normal temperature and pressure since this provides the lowest water content.

It is well known that coke includes about 5 wt% hydrogen. Thus, the rate of hydrogen introduction into the first coke-burning zone in De Bonneville et al. is 1,000 kg/hr x 5 wt% x 5 wt% or 2.5 kg/hr. Since the molecular weight of hydrogen is 2, this is equal to 1.25 kmol/hr. With sufficient oxygen, the water rate is 1.25 kmol/hr since each mole of hydrogen produces 1 mole of water. A water rate of 1.25 kmol/hr converts to 28 Nm³/hr since 1.25 kmol/hr x 22.4 l/mol x 10³ mol/kmol x 1 m³/l yields this volumetric flow rate. The content of water in the regeneration gas is thus 28 Nm³/hr of water divided by the regeneration gas volume, 10,000 Nm³/hr or 2800 ppm.

De Bonneville et al. teaches, at Column 5, lines 18-20, that 50% to 90% of the coke is burned in the first coke burning zone. Thus, the water content of regeneration gas in the second coke-burning zone is 1400 ppmv, in the case where only 50% of the coke is burned in the first coke burning zone, e.g. 2800 ppmv x 50%, to 2500 ppmv, when 90% of the coke is burned in the first coke burning zone, e.g. 2800 ppmv x 90%.

On the other hand, the water content of regeneration gas entering the second coke-burning zone in accordance with the process of the present application is 10 to 200 ppmv. Indeed, this limitation is specifically recited in Claims 6 and 17.

As emphasized in the specification of the present application, the water content of the regeneration gas entering the second coke-burning zone is critical to longer service life of the regenerated catalyst. Thus, the aforementioned distinction, which predicates novelty, under 35 U.S.C. §102(b), over De Bonneville et al. also establishes patentability over that reference under 35 U.S.C. §103(a).

Dependent Claims 3 to 9, it should be emphasized, have been amended to depend from redrafted new independent Claim 15. In addition, these claims have been amended to correct minor grammatical errors. However, the scope of these claims remain unchanged.

The above remarks establish the patentable nature of amended Claims 3-9 and 15-17 under 35 U.S.C. §102(b). It is noted in passing that Claims 11-14, which stand rejected only on formal grounds, under 35 U.S.C. §112, second paragraph, and which rejection has been overcome, as discussed above, are not subject to rejection under 35 U.S.C. §102(b). As such, these claims, which have been amended to correct obvious grammatical errors, are, like Claims 3-9 and 15-17, in condition for allowance.

The above amendment and remarks establish the patentable nature of all the claims currently in this application. Notice of Allowance and passage to issue of these claims,

Claims 3-9 and 11-17, is respectfully solicited.

Respectfully submitted,



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